UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 10/726,377 | 12/03/2003 | Richard C. Chu | POU920030166US1 | 7149 |

46369 7590 12/15/2005

HESLIN ROTHENBERG FARLEY & MESITI P.C.
5 COLUMBIA CIRCLE
ALBANY, NY 12203

| EXAMINER | |
|---|---|
| HOFFBERG, ROBERT JOSEPH | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2835 | |

DATE MAILED: 12/15/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/726,377 | CHU ET AL. | |
| | Examiner | Art Unit | |
| | Robert J. Hoffberg | 2835 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *12/3/03*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-29* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10, 13-21, 24-29* is/are rejected.

7)☒ Claim(s) *11,12,22 and 23* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *03 December 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *12/3/03*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## *Detailed Action*

## *Double Patenting*

1. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., In re Berg, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); In re Goodman, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); In re Longi, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); In re Van Ornum, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); In re Vogel, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and In re Thorington, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

a. Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1-2, 5-9, 13-14, 17-20, 24-26 and 27-29 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-3, 5-8, 16, 18-21 and 28-30 of copending Application No. 10/726,347. Although the conflicting claims are not identical, they are not patently distinct from each other.

Regarding Claims 1, 13 and 24, claims 1, 13 and 24 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 16 and 28 of copending Application No. 10/726,347. These claims in both applications provide the same structure of a heat exchanger, a first cooling loop with a control valve and a chilled water source and a second cooling loop providing coolant to electronic subsystems.

Regarding Claim 5, claim 5 is provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 2 of copending Application No. 10/726,347. These claims in both applications provide the same structure of a common source of chilled facility coolant.

Regarding Claims 6, 17 and 27, claims 6, 17 and 27 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 3 and 18 of copending Application No. 10/726,347. These claims in both applications provide the same structure of two sets of input and return lines.

Regarding Claims 7, 18 and 28, claims 7, 18 and 28 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 5 of copending Application No. 10/726,347. These claims in both applications provide same structure of multiple electronic racks being cooled by cooling units.

Regarding Claims 2, 14 and 25, claims 2, 14 and 25 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 6, 19 and 29 of copending Application No. 10/726,347. These claims in both applications provide the same structure of redundant cooling units.

Regarding Claims 8, 19 and 29, claims 8, 19 and 29 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 7, 20 and 30 of copending Application No. 10/726,347. These claims in both applications provide the same structure of a controller for automatically switching to a redundant cooling unit.

Regarding Claims 9 and 20, claims 9 and 20 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 8 and 21 of copending Application No. 10/726,347. These claims in both applications provide the same structure of a shut-off valve.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-2, 5, 7-8, 13-14, 18-19, 24-25 and 28-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi et al. (US 6,182,742).

With respect to Claim 1, Takahashi et al. teaches a cooling system comprising: at least two cooling units (MCUs), each MCU (Fig. 1, #1100A an #1100B) being capable of providing system coolant to multiple electronics subsystems to be cooled; and wherein each MCU of the at least two MCUs comprises a heat exchanger (Fig. 1, #1120A an #1120B), a first cooling loop (left side of Fig. 1, #1120A an #1120B) with at least one control valve (Fig. 1, #1170A an #1170B), and a second cooling loop (right side of Fig. 1, #1120A an #1120B), and wherein when an MCU of the at least two MCUs is operational, the first cooling loop receives chilled facility coolant (Col. 3, lines 19-20) from a source and passes at least a portion thereof through the heat exchanger, the portion being controlled by the at least one control valve, and the second cooling loop provides cooled system coolant (Col. 3, line 21) to the multiple electronics subsystems, and expels heat in the heat exchanger from the multiple electronics subsystems to the chilled facility coolant in the first cooling loop, wherein the at least one control valve allows regulation of facility coolant flow through the heat exchanger, thereby allowing

control of a desired temperature of system coolant in the second cooling loop for cooling the multiple electronics subsystems. Takahashi et al. is silent as to whether or not the cooling units are modular. It would have been obvious to one of ordinary skill in the art at the time of the invention was made to provide a means to for the units to be modular in order to quick interchangeability of components.

With respect to Claim 2, Takahashi et al. further teaches wherein when the cooling system is operational, only one MCU of the at least two MCUs is operating (Abstract, line 9) to provide system coolant to the multiple electronic subsystems, with at least one other MCU of the at least two MCUs being in a standby mode (Abstract line 10).

With respect to Claim 3, 15 and 26, Takahashi et al. fails to teach further comprising couplings associated with the at least two MCUs which allow each MCU to be removed while another MCU of the at least two MCUs is operational and providing system coolant to the multiple electronics subsystems. While Takahashi et al. fails to disclose the couplings to allow removing MCUs, it teaches servicing when a cooling unit fails (Abstract, line 12). It would have been obvious to one of ordinary skill in the art at the time of the invention was made to provide a means through couplers or any other means to allow servicing (including their removal or replacement) of the cooling units while a redundant cooling unit is operating.

With respect to Claim 4 and 16, Takahashi et al. teaches wherein each MCU comprises a pump (Fig. 1, #1110A and #1110B) for moving system coolant through the second cooling loop. While Takahashi et al. fails to disclose the couplings to allow

removing the pump, it teaches serving when a cooling unit fails (Abstract, line 12). It would have been obvious to one of ordinary skill in the art at the time of the invention was made to provide a means through couplers or any other means to allow servicing (including their removal or replacement) of the pumps while a redundant cooling unit is operating.

With respect to Claim 5, Takahashi et al. further teaches wherein the source of chilled facility coolant comprises a common source (Fig. 1, arrows on left side) of chilled facility coolant supplied to the at least two MCUs.

With respect to Claims 6, 17 and 27, Takahashi et al. teaches the cooling system, the cooled electronics system or the method of the above claims. While Takahashi et al. does not teach does not teach the redundant facility coolant supply lines and redundant facility coolant return lines independently servicing multiple MCUs, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to duplicate the chilled facility coolant source input and return lines with associated control means to automatically switch between coolant sources to insure redundancy in case of a failure of one of the chilled facility coolant sources and its lines. *In re Harza*, 274 F.2d 669, 124 USPQ 378 (CCPA 1960).

With respect to Claim 7, Takahashi et al. further teaches wherein the multiple electronics subsystems comprise multiple electronics racks (Col. 2, lines 34-36) comprising a computer room computing environment, wherein each MCU is capable of providing system coolant to cool the computer room computing environment.

With respect to Claim 8, Takahashi et al. further teaches further comprising a controller (Fig. 1, #2000) for monitoring operation of the at least two MCUs and upon detection of a failure in one MCU of the at least two MCUs, for automatically switching (Col. 3, lines 58-64) to another MCU of the at least two MCUs to ensure continued cooling of the multiple electronics subsystems.

With respect to Claims 9 and 20, Takahashi et al. teaches the cooling system, the cooled electronics system of the above claims. While Takahashi et al. fails to disclose that the controller may control the chilled facility coolant flow, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to rearrange the parts to allow the controller to selectively direct the chilled facility coolant (in the first loop) instead of the system coolant (in the second loop) in order to control the temperature of the system coolant to cool the electronic components (the system coolant temperature could be controlled by changing the flow in either loop). It has been held that rearrangement of parts with a motivation or reason is sufficient to support a finding of obviousness to one skilled in the art. *Ex Parte Chicago Rawhide Mfg. Co.*, 223 USPQ 351, 353, (Bd. Pat. App. & Inter. 1984).

With respect to Claim 10 and 21, Takahashi et al. teaches the cooling system or cooled electronics system of claims 1 and 13, respectively above. Takahashi et al. further teaches a system coolant expansion tank (Fig. 1, #1400) in communication with the second cooling loop, and wherein the system coolant expansion tanks of the at least two MCUs are connected in fluid communication (see Fig. 1) to ensure that sufficient system coolant remains in the system coolant expansion tank of an operating MCU.

While Takahashi et al. fails to teach a separate system coolant tank for each MCU, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to duplicate the system coolant expansion tank to insure redundancy in case of a failure of one of the expansion tanks. *In re Harza*, 274 F.2d 669, 124 USPQ 378 (CCPA 1960).

With respect to Claim 13, Takahashi et al. teaches a cooled electronics system comprising: multiple electronics subsystems (Col. 2, lines 34-36); at least two cooling units (MCUs), each MCU (Fig. 1, #1100A an #1100B) being capable of providing system coolant to the multiple electronics subsystems to be cooled; and wherein each MCU of the at least two MCUs comprises a heat exchanger (Fig. 1, #1120A an #1120B), a first cooling loop (left side of Fig. 1, #1120A an #1120B) with at least one control valve (Fig. 1, #1170A an #1170B), and a second cooling loop (right side of Fig. 1, #1120A an #1120B), and wherein when the MCU is operational, the first cooling loop receives chilled facility coolant (Col. 3, lines 19-20) from a source and passes at least a portion thereof through the heat exchanger, the portion being controlled by the at least one control valve, and the second cooling loop provides cooled system coolant (Col. 3, line 21) to the multiple electronics subsystems, and expels heat in the heat exchanger from the electronics subsystems to the chilled facility coolant in the first cooling loop, wherein the at least one control valve allows regulation of facility coolant flow through the heat exchanger, thereby allowing control of temperature of system coolant in the second cooling loop for cooling the multiple electronics subsystems. Takahashi et al. is silent as to whether or not the cooling units are modular. It would have been obvious to

one of ordinary skill in the art at the time of the invention was made to provide a means to for the units to be modular in order to quick interchangeability of components.

With respect to Claim 14, Takahashi et al. further teaches wherein when the cooled electronics system is operational, only one MCU of the at least two MCUs is operating to provide system coolant to the multiple electronics subsystems (Abstract, line 9).

With respect to Claim 18, Takahashi et al. further teaches wherein the multiple electronics subsystems comprise multiple electronics racks which together comprise a computer room computing environment, wherein each MCU of the at least two MCUs is capable of providing system coolant (Col. 3, line 21) to cool the computer room computing environment.

With respect to Claim 19, Takahashi et al. further teaches further comprising a controller (Fig. 1, #2000) for monitoring the at least two MCUs and upon detection of a failure in one MCU of the at least two MCUs, for automatically switching (Col. 3, lines 58-64) to another MCU of the at least two MCUs to ensure continued cooling of the multiple electronics systems.

With respect to Claim 24, Takahashi et al. teaches a method for cooling multiple electronics subsystems (Col. 2, lines 34-36), the method comprising: providing at least two cooling units (MCUs), each MCU (Fig. 1, #1100A an #1100B) being capable of providing system coolant to multiple electronics subsystems to be cooled, wherein each MCU of the at least two MCUs comprises a heat exchanger (Fig. 1, #1120A an #1120B), a first cooling loop (left side of Fig. 1, #1120A an #1120B) with at least one

control valve (Fig. 1, #1170A an #1170B), and a second cooling loop (right side of Fig. 1, #1120A an #1120B) with system coolant (Col. 3, line 21); providing, for a selected MCU of the at least two MCUs, chilled facility coolant (Col. 3, lines 19-20) to the first cooling loop from a source and passing at least a portion thereof via the at least one control valve through the heat exchanger; providing, for the selected MCU of the at least two MCUs, cooled system coolant from the second cooling loop to the multiple electronics subsystems, and expelling heat in the heat exchanger from the multiple electronics subsystems to the chilled facility coolant in the first cooling loop; and wherein the at least one control valve of the selected MCU allows regulation of facility coolant flow through the heat exchanger, thereby allowing control of temperature of the system coolant in the second cooling loop for cooling the multiple electronics subsystems. Takahashi et al. is silent as to whether or not the cooling units are modular. It would have been obvious to one of ordinary skill in the art at the time of the invention was made to provide a means to for the units to be modular in order to quick interchangeability of components.

With respect to Claim 25, Takahashi et al. further teaches further comprising cooling the multiple electronics subsystems employing only one MCU (Abstract, line 9) of the at least two MCUs, with the other MCU of the at least two MCUs being in a standby mode (Abstract line 10).

With respect to Claim 28, Takahashi et al. further teaches wherein the multiple electronics subsystems comprise multiple electronics racks comprising a computer room computing environment, and wherein the method further comprises providing

system coolant to cool the computer room computing environment from only one MCU (Col. 3, line 21) of the at least two MCUs at a time.

With respect to Claim 29, Takahashi et al. further teaches further comprising monitoring operation (Fig. 1, #2000) of the at least two MCUs, and upon detection of a failure in one operating MCU of the at least two MCUs, automatically switching (Col. 3, lines 58-64) to another MCU of the at least two MCUs to ensure continued cooling of the multiple electronics subsystems.

***Allowable Subject Matter***

4. Claims 11-12 and 22-23 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: Claims 11 and 22 and all claims dependent thereof are allowable over the art of record because the prior art does not teach or suggest that a cooling unit comprising of a "heat exchanger", a "first loop receiving chilled facility coolant", a "second loop providing cooled system coolant" to the electronics, a "control valve" regulating the temperature of the loops, and "system coolant tank" containing the heat exchanger inside of it. The closest references to present invention are believed to be Choi (KR 2003057159) and Laing (GB 2216997 A) that teach a heat exchanger contained within an expansion tank in a heating application. Funke (US 4,854,382) teaches a plate heat exchanger that can be mounted directly on an expansion tank.

The aforementioned limitations in combination with all remaining limitations of the respective claims are believed to render said claims 11 and 22 and all claims dependent thereof patentable over art of record.

***Conclusion***

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Kawashima et al. (US 4,865,123) teaches a plurality of CCUs in an electronic system. Hare et al. (US 6,035,655) and Stahl et al. teach redundant cooling systems. Stefani (US 5,226,471) teaches a bypassing to isolate a leaking CCU. Mizuno et al. teaches a controller to control the operation of the CCUs.
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Robert J. Hoffberg

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Robert J. Hoffberg whose telephone number is (571) 272-2761. The examiner can normally be reached on 8:30 AM - 4:30 PM Mon - Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lynn D. Feild can be reached on (571) 272-2092. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

RJH

LYNN FEILD
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800